

Comments on Review of PINES radiation survey
By Larry Jensen
October 12 2011

I have read the review of the PINES radiation survey sent by Matthew J. Ohl to Paul Kysel. My reaction is that (1) this review was not done by someone fluent with environmental radiation surveys and (2) the reviewers did not read all the material submitted to Region 5 U.S. Environmental Protection Agency (USEPA5). There are numerous errors.

Calibration of the instrument was done by Auxier and Associates, a long standing radiation survey consulting company that is intimately familiar with environmental radiation measurements for naturally occurring radionuclides. It is standard procedure to use cesium-137 for these calibrations. I am sure their work is court defensible.

The reviewer misses the point of this survey – to determine if any radionuclides were present where coal combustion byproducts were present and to determine if these were distinct from background. This was done. Attached is an internet page from the U.S. Department of Health and Human Services stating that twice background is indicative of contamination. Materials in Pines are clearly distinct from background.

In the reviewer's Survey Methodology and Interpretation the procedure of this survey was interpreted incorrectly. The first action by PINES was to locate radiologically elevated regions, giving the range of readings, and then to get a more exacting measurement through a two minute count where the readings appeared highest. This latter reading was the one used to make judgments.

The PINES group was not fiscally able to extend measurements beyond this survey. That is why PINES made the five recommendations included in the survey report. The intent was for USEPA5 to first confirm PINES readings and then to determine the radionuclides and their concentrations. Two years after PINES submitted this report, USEPA5 has only now responded to this survey.

In the reviewer's Conclusions and Recommendations PINES is criticized for not exploring the human health pathways. This is wrong. PINES, subsequent to the radiation survey, did a risk assessment for external exposure to X-rays and gamma radiation, concluding, for this single pathway that the 30-year risk could be as high as 1.2 E-03, well above the upper limit for Superfund. USEPA5 has never acknowledged this risk assessment although it was submitted in 2010.

In trying to find sufficient data to perform this risk assessment, it appears that material buried in Yard 520 exceed the commonly used cleanup criterion for total radium used by USEPA5. The criterion is that in Title 10 Part 192 of the Code of Federal Regulations, namely 5 picocuries per gram total radium.

Finally, PINES recommended that, if Pines drinking water is chemically contaminated, it should be investigated for radioactive contamination as well. PINES does not believe USEPA5 has done this.

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Types of Radiation

- Electromagnetic radiation
 - Examples: ultraviolet, visible light, [x-rays](#), [gamma rays](#)
 - No mass, no charge
- Particulate radiation
 - Examples: [alpha particles](#), [beta particles](#), [neutrons](#)
 - All have mass
 - Some have charge (alpha, beta), some have no charge (neutron)
- [Ionizing radiation](#) (OSHA)
 - Radiation with sufficient energy to eject electrons from atoms ([ionization](#))
- [Non-ionizing radiation](#) (OSHA)
 - Radiation without sufficient energy to produce ionizations

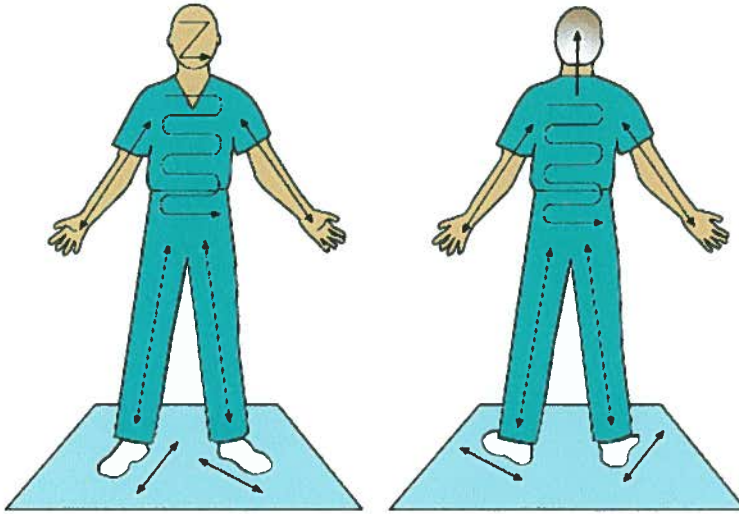
- [Video: Radiation Principles](#) (HHS/CDC)
- [Video: Types of Ionizing Radiation and Shielding Required](#) (HHS/CDC)
- [Animation: Alpha Radiation](#) (IAEA)
- [Animation: Beta and Gamma Radiation](#) (IAEA)

Resources:

- [Radiation](#) (OSHA)
- [Introduction to ionizing radiation](#) (OSHA)
- [Ionizing radiation](#) (PDF - 76 KB) (Argonne National Laboratory)

How to do a Survey for Radiation Contamination

[Print this section](#) 



- Survey with [Geiger-Mueller Detector](#)
 - Probe held about 1/2 inch from surface
 - Move at a rate of 1 to 2 inches per second
 - Follow a systematic pattern (see below)
 - Document readings in counts per minute (CPM) on a [body chart](#) (PDF - 49 KB)
 - Compare radiation survey results before and after decontamination procedure
- Use nuclear medicine and radiation therapy technologists or others familiar with the use of radiation detection instruments
- Goal is **< 2 times background radiation reading**
- In general, areas that register **more than twice** the previously determined background radiation level are considered contaminated.
- For accidents involving [alpha particle emitters](#), if the reading is less than twice the background radiation level, the person is not contaminated to a medically significant degree. If the accident circumstances indicate that an alpha particle emitter (such as plutonium) or low-energy beta emitter could be a contaminant, a health physicist should always be consulted.
- Specifics of the survey
 - Have the person stand on a clean pad.
 - Instruct the person to stand straight, feet spread slightly, arms extended with palms up and fingers straight out.
 - Monitor both hands and arms; then repeat with hands and arms turned over.
 - Starting at the top of the head, cover the entire body, monitoring carefully the forehead, nose, mouth, neckline, torso, knees, and ankles.
 - Have the person turn around; repeat the survey on the back of the body.
 - Monitor the soles of the feet.

Adapted from [How to Detect Radiation](#) (Radiation Emergency Assistance Center/Training Site (REAC/TS))

See also: [Video: Screening People for External Contamination: How to Use Hand-held Radiation Survey Equipment](#) (HHS/CDC) 